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ABSTRACT

In the past 5 years, the Mathematics Department at Saint Louis Community College (SLCC) in Meramec, Missouri, has made major curricular modifications and changed the role of faculty members in helping students succeed. These changes have been made in an effort to bring the curriculum in line with the National Council of Teachers of Mathematics' 1986 standards for K-12 education; to implement the proposals of the Calculus Reform Movement; and to accommodate students with poor math preparation. Changes that have taken place within many mathematics departments throughout the country include the following: (1) mathematics departments are more accepting of the use of technology and computer-managed instruction, offering underprepared students an alternative to traditional classroom situations; (2) faculty are working with increasing numbers of disabled students to identify the academic adjustments that will help them succeed; (3) faculty are facing the attitudinal effects of grade inflation; (4) faculty teach study skills during the course of the semester, and many feel the loss of prestige associated with teaching developmental classes; (5) faculty are involved in making referrals to college writing centers, study skills labs, and tutoring centers on campus; (6) mathematics departments are more accepting of the use of calculators and computers in mathematics courses; and (7) department chairs are more involved in facilitating classroom instruction. Among the change-related issues still to be resolved are the difficulty of involving aging faculty in staff development activities that will help them adjust to changing students and instructional technologies; the need to involve part-time faculty in departmental meetings and professional development activities and to provide them with needed support systems; and the difficulties associated with developing assessment instruments, policies, and procedures. (KP)

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Revising the Mathematics Department

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Lillian Seese received her Bachelor's degree in Mathematics at The Colorado College, in Colorado Springs, Colorado. She then held a teaching assistantship while she completed her Masters Degree in Mathematics at Boston College. Her specialization was the abstract field of Algebraic Topology, and she took additional graduate courses at Texas Tech University. Lillian recently completed a Masters degree in Computers in Education at Fontbonne College in St. Louis.

Lillian's first teaching position was in a junior high school located in Idalou, Texas. She then taught at Texas Tech University and McMurry College in Texas. Upon moving to St. Louis in 1978, she began teaching part-time at St. Louis Community College at Meramec. The switch from abstract Mathematics to practical applications taught in the pre-engineering curriculum at Meramec marked a turning point for Lillian, and she became interested in the uses of technology in higher education.

Eight years after becoming a full-time faculty member at Meramec, Lillian co-authored a Trigonometry course for TICCIT (a computer managed instructional system used on her campus). She has served as the chair of the Department of Mathematics since 1988. The department serves approximately 4500 students each semester, and is the largest Mathematics Department in the state in terms of faculty, staff and student credit hours. Lillian's activities as chair have centered around student placement into the Mathematics curriculum, developing a support system for part-time faculty in the department, insuring consistency in multi-section courses, and keeping abreast of the changes in the Mathematics curriculum, including the use of technology in the classroom.

As Phi Theta Kappa advisor, Lillian was selected as Outstanding Advisor in her region, as a Top Ten Advisor nationally, and as a Giles Distinguished Advisor. Lillian was given an award on her campus for outstanding teaching in 1985. She was presented with the Distinguished Service Award at Meramec, and is the recipient of one of the National Community College Academy's Outstanding Department Chair awards.

Historically there may be more resistance to change from Mathematics faculty than from faculty in other areas. Recently, however, comfort zones have been pinched and change has become a necessity. Community college Mathematics departments did not change much before the late 1980's, but since then both the curriculum and the departments themselves have undergone major revisions. The ideas presented in this paper reflect what directions we have taken in the Mathematics Department at Saint Louis Community College at Meramec. I do not claim that these are the only directions that a department can take, nor do I believe that our department will always move in this direction. A faculty that takes part in explorations and discussions will go a long way to guarantee that not only change, but also growth takes place within their department.

Revisions to curriculum:

The material covered in Mathematics programs at community colleges has not changed much since the decade between 1963 and 1973 when 60% of today's community colleges were formed. Unlike other disciplines, Mathematics curriculum is not effected much by current events, by new developments in higher level Mathematics, or by developments in other fields. Until recently there has been little disagreement about what topics should be covered in a Mathematics program offered at a community college.

For a variety of reasons, America's Mathematics skills are currently abysmally low. The study of Mathematics, which tends to be very non-forgiving, does not mix well with the current student mentality of entitlement, the tendency to point fingers of

blame, and a low level of committment to educational pursuits . Surveys show that fewer students than ever report that their parents think it is important to do homework. American students taking a Mathematics test recently scored poorly, but as they left the test they reported that they felt good about their performances. Calculators have been relied on at all levels of the K-12 curriculum. A shortage of qualified Mathematics teachers has caused a low level of preparation for elementary school teachers.

At the K-12 level, response to the situation has come in the form of the National Council of Teachers of Mathematics' 1986 Standards. Recommendations include that Mathematics curriculum be revised to enable students to work together, to learn to value Mathematics, to learn to reason mathematically, and to learn to use conjecture, invent and solve problems and connect to applications. Though they are gaining wide acceptance, these Standards are not necessarily the complete solution to our country's Mathematics problems. On a recent standardized test, students in states that have adopted these standards did not score as well as those who have not adopted them.

At the post-secondary level, Mathematics programs are struggling as well. Many community college students are part-timers because of necessary commitments to jobs and family. Sometimes a lack of committment causes students to fail to take education seriously. The high attrition rate becomes a serious problem when students look at classes as they do television programming. As if they held a remote control channel changer, they stay with a class as long as it satisfies them. Because of many factors, 60% of college Mathematics courses merely repeat material that was taught

but unlearned in high school. Each year, industry spends as much on remedial Mathematics education for employees as is spent on Mathematics education in schools. Once students have completed developmental courses, the higher level Mathematics courses still act as gatekeepers for other disciplines. A full 50% of American college students fail first semester calculus each year. The number of entering college students expecting to major in Mathematics is only one-sixth of what it was in the 1960's.

In addition to adjusting the community college Mathematics curriculum to bring it in line with the NCTM standards, there has been a recent Calculus Reform movement which has received extensive funding and attention from the National Science Foundation. Nationally, colleges are urged to do what community colleges have always done - limit class size, be sure that classes are taught by professors rather than teaching assistants, and be sure that professors are available to students outside of class. In addition, most Calculus Reform proposals suggest using technology as a tool to enable students to look at more complex applications, to use Mathematical modeling techniques, and to avoid doing computations "by hand."

Revisions to the department:

As Mathematics faculty members, we tend to teach and think as our professors did years ago. We lecture on the same topics, and in the same way that professors have for decades. The main differences among Mathematics faculty members is usually in how they perceive their students. Because faculty members in a community college are generally there because they enjoy and value teaching, the level of

concern for students remains high, as it was in the early community college days. Recent years have seen major changes in what Mathematics faculty members must do to help their students succeed.

Our students have changed. Community colleges serve more underprepared students than ever before. These students are underprepared to compete either in college or in the work force. If we choose to continue as open-door institutions, we must meet the needs of these students. The use of technology and computer managed instruction can offer students an option to the traditional classroom situation which, in many cases, has not worked for students in the past. Community colleges have more disabled students each semester. Learning disabled, physically disabled, and emotionally disabled students register for classes, and faculty members work with them to determine which academic adjustments will help them succeed. The attitude that students have that they are entitled to high grades is an increasing problem in Mathematics departments. A Mathematics course is often the first time that students are exposed to the idea that "you only get what you give in life."

Our course content has changed. This is as a result of the changes in our student body, the NCTM Standards, and the Calculus reform movement. Faculty now teach study skills during the course of the semester. Faculty often feel the loss of prestige associated with teaching developmental classes, rather than the higher level courses with which they are more experienced and comfortable. Referrals are often made to college writing centers, study skills labs, and the various tutoring centers on campus. Community colleges have become more accepting of the use of calculators and computers in Mathematics courses. One of the major concerns facing

Mathematics departments in the area of course content is the delicate balance between upholding academic standards and changing the content of courses to help students succeed. It is often depressing to see the accommodations that are made in order to take the path of least resistance.

Our faculty is changing. In most community colleges, many of the original faculty members are still teaching, and they are often not as agreeable to change as they could be. It is not always an easy task to involve aging faculty members in staff development activities or get them to attend conferences and workshops on using technology, or working with developmental students, disabled students, or students with diverse social, economic and cultural backgrounds. Faculty expectations are also changing. The days when faculty members' expectations of their chairs were limited to providing a good schedule and communicating their needs to administration are gone. With today's more complex academic world and more diverse student body, chairs are more involved in facilitating classroom instruction and taking care of a myriad of details, so that faculty can concentrate on what goes on in the classroom.

Not only are students part-timers, but an increasing number of faculty are part-timers as well. Nation-wide, the percent of part time faculty in community colleges has more than tripled since 1970. In a department where multi-section courses are taught, and most students take four sequential courses, it is extremely important that part-time faculty members are aware of department policies, procedures, and standards. Part-time faculty should be involved in department meetings and professional development activities. Support systems can be devised for part-time instructors based on which course they teach. Each full-time faculty member can oversee a multi-section course

and see that part-time instructors meet to discuss textbooks, course objectives, and teaching methods. In this scenario, it is likely that each part-time instructor will be in contact with several full-time faculty members each semester. Meetings and workshops can be planned involving all faculty to discuss writing in Mathematics courses, calculator uses, math study skills, and developing and grading tests. Classroom visits and student surveys can be conducted for part-time faculty members, using a student questionnaire that enables faculty to choose the questions their students will be asked. Visiting other faculty members' classes offers an excellent opportunity for faculty members to think about teaching methods. As faculty roles change it is important to have a chair that is willing and able to provide educational leadership, to motivate faculty and to support excellent teaching.

Technology has changed the way we teach. While many departments do not allow the use of calculators in Basic Mathematics courses, many now are using graphing calculators and software programs in College Algebra, Linear Algebra, and Calculus courses, and offering courses in Mathematical applications using graphing calculators and computer software. Computer managed instruction and drill and practice software are becoming more common at community colleges.

The role played by assessment and accountability has changed. As students come to community colleges with such a wide spread of backgrounds in Mathematics, placement becomes more important. Developing instruments, policies, and procedures is a difficult task. Instruments must be chosen or developed, cut-off scores must be set, and in some cases, a procedure must be provided for students to challenge their placement. The resistance of the faculty to implementing placement

testing is usually balanced by the feeling that students are generally placed in courses in which they have a good chance of succeeding. However, there is a great need to provide appropriate intervention for students who are not succeeding. Mathematics faculty members can meet regularly with advisors and work at registration in an effort to help students with Mathematics related course placement issues and to communicate the department's concerns about student placement and success. In a multi-campus district, there is a need for agreement on a common placement instrument and procedure. Exit testing may be required of students, and can include many components. The issue of accountability and outcomes assessment is one that is currently beginning to receive wide attention in the state of Missouri. Departmental exams can be included as outcomes assessment measures in core courses. Data compiled can be used to help instructors compare their students' success with those of the department in general. There may be resistance to outcomes assessment, though it is a growing issue in the state and across the nation.

In the past five years there have been major changes both in Mathematics curriculum and in what Mathematics faculty members do to help their students succeed. I suggest that each time the word "Mathematics" appears in this paper, it could be changed to any other discipline and the paper would still be a realistic look at what is happening in community colleges today. The same spirit that drew faculty to community colleges years ago is alive and well on our campuses today. It is this desire to try something different, and to communicate with each other to find out how to help students succeed that has kept community colleges alive and healthy for so long.